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Terrestrial Isopods from Sri Lanka, V: Trachelipidae and Porcellionidae (Crustacea)

by

F. FERRARA * and R. ARGANO **

With 4 figures

ABSTRACT

Three species of Trachelipidae and five of Porcellionidae are recorded from Sri Lanka. One of these species, *Agnara taprobanica* n. sp., is described as new. A re-arrangement of the genera of both families is proposed. The genera *Hemiporcellio* Collinge, 1915 and *Protracheoniscus* Verhoeff, 1917 are considered as junior synonyms of *Agnara* Budde-Lund, 1908.

INTRODUCTION

Among the material coming from Sri Lanka, assigned to us by Lund University (Sweden) and the Geneva Museum (Switzerland), we have recognized three species of Trachelipidae, which can be attributed to the genus *Nagurus* Holthuis, 1949, and five species of Porcellionidae, two of which belong to the genus *Agnara* Budde-Lund, 1908.

A brief discussion about the families Trachelipidae and Porcellionidae seems necessary in order to clarify the sense in which they are intended in the present work.

On the basis of the breathing apparatus ARCANGELI (1952) recognized two distinct phyletic lines within the family Porcellionidae. In one line, which includes the genera *Trachelipus* Budde-Lund, 1908 and *Nagara* Budde-Lund, 1908 (=*Nagurus*), this

* Centro di Studio per la Faunistica ed Ecologia Tropicali del Consiglio Nazionale delle Ricerche, Via Romana 17, 50125 Firenze, Italy.

** Dipartimento di Biologia Animale e dell'Uomo — Zoologia, Universitá di Roma «La Sapienza», Viale dell'Universitá 32, 00185 Roma, Italy.

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apparatus occupies the external marginal area of the exopods of all five pairs of pleopods, and, according to ARCANGELI (1924) and MACCAGNO (1939), "is composed of many irregular folds spreading toward the lobe edge and limitating some more or less deep furrows" and totally excludes the existence of "channels, microstomes, tubules with collecting cavities, opening through one or more holes" (ARCANGELI 1952). HOESE (1982) fully confirmed this description under the scanning microscope and evidenced tiny secondary folds.

The other line is characterized by "a more perfectioned breathing system, with tracheae" and includes some genera with five pairs of pseudotracheae (including *Protracheoniscus* Verhoeff, 1917 and *Cylisticus* Schnitzler, 1853), one with three pairs (*Orthometopon* Verhoeff, 1917) and some with two pairs (*Porcellio* Latreille, 1804 and related genera) (ARCANGELI 1952).

This very clear and up-to-date position has been afterwards completely ignored.

In fact STROUHAL (1953) created the subfamily Trachelipinae within the family Porcellionidae, based exclusively on the number (five pairs) of pseudotracheae. This subfamily includes the Cylisticinae (as a tribe), formerly established as a subfamily by VERHOEFF (1949) on the same grounds.

VANDEL (1964) elevated the Trachelipinae to the family level, apparently attributing importance to the structure of the breathing apparatus. But, since his conclusions are based on incorrect observations of VERHOEFF (1917, 1920), he actually reattributes a substancial importance to the number of pseudotracheae. Indeed, VANDEL (1970) himself created the subfamily Tritracheata within the Trachelipidae (*sensu* STROUHAL), and, due to an erroneous interpretation of BUDDE-LUND's (1908) latin diagnosis, included the genus *Agnara,* thereby making it the neotenic ancestor of the other subfamily Quinquetracheata. Also included in the family is the genus *Phalaba* Budde-Lund, 1910 with the species *P. zambeziana* Vandel, 1970 which, being a Pseudotracheata with a 3-jointed antennal flagellum, became a typical "missing link" and "proof" of the origin of Pseudotracheata from "Oniscidae".

Apart from the fact that *Agnara* has five pairs of pseudotracheae, moreover not of the *Trachelipus*-type, and that *Phalaba zambeziana* belongs to the genus *Aphiloscia* Budde-Lund, 1908 (therefore to the "Oniscidae"), the above approach overlooks the concept of a taxonomic category as an evolutive unit (at various levels) as claimed by systematics. The family Trachelipidae, *sensu* STROUHAL and VANDEL, is presently estimate to include some 15 genera (SCHMALFUSS & FERRARA 1978).

In this paper, we consider the family Trachelipidae in the sense proposed by ARCANGELI (1952) for the phyletic line which includes *Trachelipus* and *Nagurus.* ARCANGELI (1963), in turn, ignored STROUHAL (1953) and proposed instituting the subfamily Trachelipinae for the two genera (and *Nagaroides* Wahrberg, 1922).

As the independence of the genera *Nagaroides* and *Pagana* Budde Lund, 1908 from the genus *Nagurus* has yet to be demonstrated, the family Trachelipidae, *sensu* ARCANGELI, is presently considered to include the only two genera known to have *Trachelipus*-type pseudotracheae: *Trachelipus* and *Nagurus.*

We propose that the other genera mentioned by SCHMALFUSS & FERRARA (1978) for the family Trachelipidae (*sensu* STROUHAL and VANDEL) should be included in the family Porcellionidae which they belonged to in the past on the basis of the breathing system which can be generally defined as of the *Porcellio*-type. We also propose that these genera, to which *Tritracheoniscus* Taiti and Manicastri, 1985, *Hemilepistoides* Borutzky, 1945 and probably others will be added, should constitute a group of genera, the *"Agnara"*

group. The independence of this group from the Porcellionidae Bitracheata and its relationship with related families, as Cylisticidae, are yet to be analyzed and discussed.

Abbrevations used throughout the text:
LUCE = Lund University Ceylon Expedition 1962 (P. Brinck, H. Andersson and L. Cederholm);
MF = Museo Zoologico dell'Universitá, Firenze;
MHNG = Museum d'histoire naturelle, Genève;
MZUR = Museo Zoologico dell'Universitá, Roma;
USNM = National Museum of Natural History, Smithsonian Institution, Washington, D.C.;
ZIUL = Zoological Institute, University of Lund.

Family TRACHELIPIDAE
Genus **Nagurus** Holthuis, 1949
Nagurus cristatus (Dollfus, 1889)

MATERIAL. — Sri Lanka: 5♀♀, Central Prov., Kandy, Loc. 9, leg. LUCE, 12.I.1962, ZIUL; 2♀♀, Western Prov., Yakkala, 18 mls NE Colombo, Loc. 11, leg. LUCE, 15.I.1962, ZIUL; 2♀♀, Western Prov., Alawala, 26 mls NE Colombo, Loc. 14: IV, leg. LUCE, 17.I.1962, ZIUL; 12♀♀ Southern Prov., Udugama, 15 mls NNE Galle, Loc. 27: II, leg. LUCE, 27.I.1962, ZIUL; 1♀, Southern Prov., Haycock Mountain, 21 mls NNE Galle, Loc. 32, leg. LUCE, 28.I.1962, ZIUL; 1♀, North Western Prov., Andapolakanda, 3 mls NE Melsiripura, Loc. 53, leg. LUCE, 7.II.1962, ZIUL; 1♀, Sabaragamuwa, Kuruwita, 6 mls NNW Ratnapura, Loc. 90: III, leg. LUCE, 17-23.II.1962, ZIUL; 4♀♀, Sabaragamuwa, Maratenna, 7 mls N Balangoda, Loc. 98, leg. LUCE, 22.II.1962, ZIUL; 3♀♀, Eastern Prov., Kokagala Mountains, 20 mls N Bibile, Loc. 139, leg. LUCE, 13.III.1962, ZIUL.

Distribution. — Pantropical. This parthenogenetic species is common also in greenhouses of temperate areas.

Nagurus nanus (Budde-Lund, 1908)

MATERIAL. — 10♂♂, 5♀♀, Western Prov., Colpetty, Loc. 2, leg. LUCE, 5-13.I.1962, ZIUL; 1♀, Kalutara, 25 mls SSE Colombo, Loc. 19, leg. LUCE, 25.I.1962, ZIUL; ?1♀, Sabaragamuwa, Nonpareil Estate, 3 mls NE Belihul-Oya, Loc. 108, leg. LUCE, 1.III.1962, ZIUL; 1♀, Monaragala Mountain, 25 mls E Badulla, Loc. 121: I, leg. LUCE, 7.III.1962, ZIUL; 1♀, Uva Prov., Wellawaya, 18 mls S Badulla, Loc. 167: I, leg. LUCE, 21.III.1962, ZIUL.

Distribution. — Pantropical. Also in greenhouses in temperate areas.

Nagurus travancorius (Verhoeff, 1936) (Figs 1-2)

MATERIAL. — 2♂♂, 2♀♀, Anaradhapura (archaelogical zone), leg. L. Bartolozzi, 22.XI.1984, MF; 1♂, Bundala, leg. L. Bartolozzi, 30.XI.1984, MF; 1♂, 1♀ juv., Yala, leg. Cl. Besuchet and I. Löbl, 24.I.1970, MHNG; 6♂♂, 9♀♀, Rajakadaluwa, leg. Cl. Besuchet and I. Löbl, 31.I.1970, MHNG; 1♀, Western Prov., Yakkala, 18 mls NE Colombo, Loc. 10, leg. LUCE, 14.I-26.III.1962, ZIUL; 1♂, Western Prov., Yakkala, 18 mls NE Colombo, Loc. 12, leg. LUCE, 16.I.1962, ZIUL; 1♂, Western Prov., Alawola, 26 mls NE Colombo, Loc. 13: I, leg. LUCE, 17.I.1962, ZIUL; 1♂, 1♀, Yakkala, 18 mls NE Colombo, Loc. 16: I, leg. LUCE, 20-23.I.1962, ZIUL; 1♂, 1♀, North Western Prov., Bangadeniya, 4 mls NNE Chilaw, Loc. 39, leg. LUCE, 1.II.1962, ZIUL; 1♂, 7♀♀, North Western Prov., Mundal lake, 16 mls N Chilaw, Loc. 40, leg.

LUCE, 1.II.1962, ZIUL; 1♂, 1♀, North Western Prov., Ambalam, 7 mls NE Puttalam, Loc. 43, leg. LUCE, 1.II.1962, ZIUL; 1♂, North Western Prov., 10 mls E Puttalam, Loc. 45, leg. LUCE, 2.II.1962, ZIUL; 1♂, 4♀♀, North Central Prov., Maradan Maduwa, Wilpattu National Park, 23 mls W Anuradhapura, Loc. 48, leg. LUCE, 2-3.II.1962, ZIUL, 1♂, North Central Prov., Tolawa, 9 mls SSW Anuradhapura, Loc. 51, leg. LUCE, 4.II.1962, ZIUL; 1♂, North Western Prov., Andapolakanda, 3 mls NE Melsipura, Loc. 53, leg. LUCE, 7.II.1962, ZIUL; 1♀, North Central Prov., Ritigala Natural Reserve, 8 mls NW Habarawa, Loc. 56: I, leg. LUCE, 8.II.1962, ZIUL; 2♂♂, Eastern Prov., Kuchchaveli, 20 mls NW Trincomolee, Loc. 60, leg. LUCE, 9-10.II.1962, ZIUL; 2♀♀, Northern Prov., 2 mls W Pourt Pedro, sandy beach, Loc. 69, leg. LUCE, 13.II.1962, ZIUL; 1♀, Northern Prov., Mankulam, Loc. 74, leg. LUCE, 13-14.II.1962, ZIUL; 1♀, Northern Prov., Nauthi Kadal lagoon, 3 mls S Mullaittivu, Loc. 79, leg. LUCE, 14.II.1962, ZIUL; 2♀♀, Sabaragamuwa, Butkanda, 8 mls SE Rakwaua, Loc. 104, leg. LUCE, 28.II.1962, ZIUL; 1♀, Uva, Kuda Oya, 15 mls S Wellawaya, Loc. 168, leg. LUCE, 22.III.1962, ZIUL.

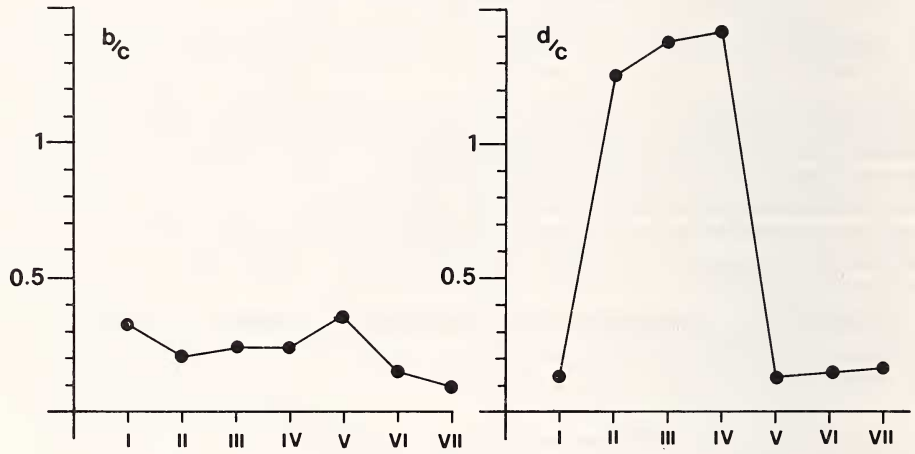

FIG. 1.

Nagurus travancorius (Verhoeff, 1936), ♂: co-ordinates of the noduli laterales.

DESCRIPTION. 5-6 mm long. Yellowish brown. Dorsum with small distinct tubercles; tergites equipped with small triangular scale-spines; 2-3 gland pores per side near the lateral margins of pereonites 2-7. Noduli laterales arranged as in *N. cristatus* and *N. nanus*. Eye with 8-10 ommatidia. Cephalon with big lateral lobes bent up and outwards; medial lobe triangular, scantily protruding upwards in the middle. Pereonites 1 and 2 with straight posterior margin and rounded postero-lateral angle; pereonites 3-7 with posterior tip of epimera protruding backwards. Telson with regularly incurved sides and pointed apex. Pereopods with long dactylar setae. Protopod of uropods with a slight indentation on outer margin separating two portions projecting equally backwards.

Male. — Pereopods 1-2 with a thick brush of spines on carpus and merus. Pereopod 7 ischium with sternal margin straight. Pleopod 1: exopod with short posterior point, more developed in large specimens; endopod with pointed apex equipped with a row of spines on medial margin. Pleopod 2 as in Fig. 2H.

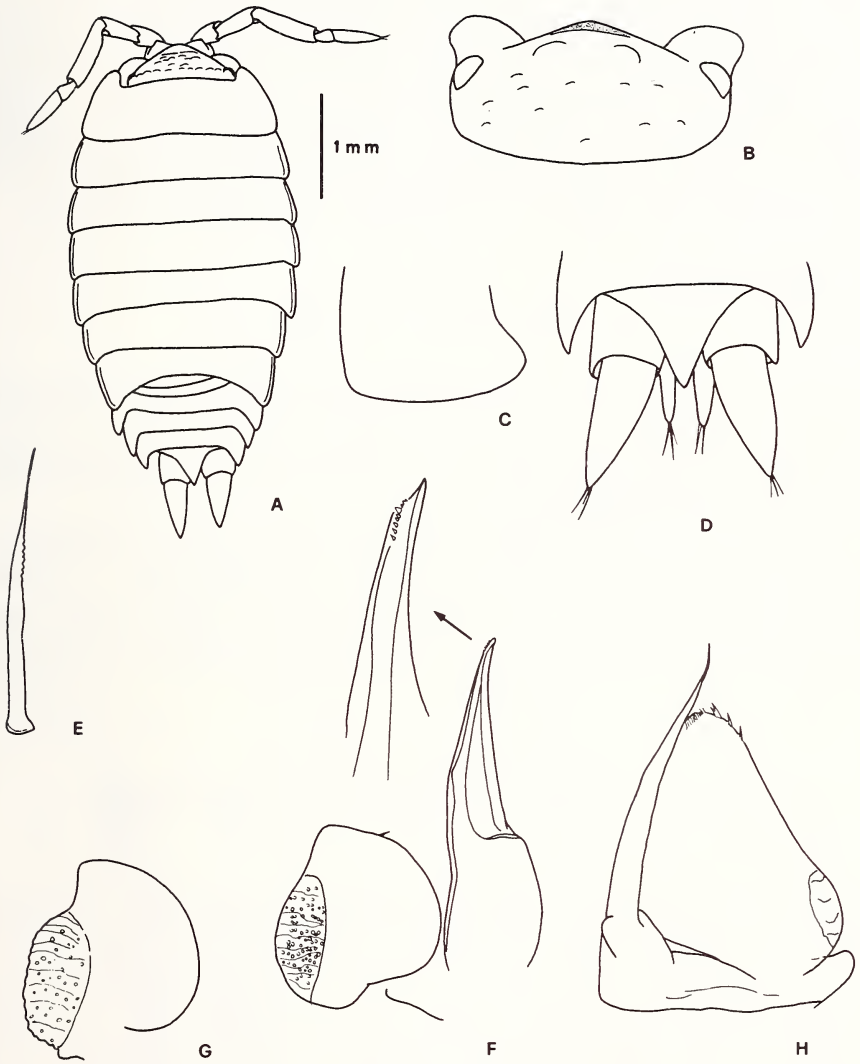

FIG. 2.

Nagurus travancorius (Verhoeff, 1936), ♂: A) adult specimen in dorsal view; B) cephalon in dorsal view; C) right epimeron of pereonite 1; D) telson and uropods; E) spine of carpus and merus of pereopods 1 and 2; F) pleopod 1 (specimen 4.5 mm long); G) exopod of pleopod 1 (specimen 5.2 mm long); H) pleopod 2.

REMARKS. — *N. travancorius* is close to *N. nanus, N. acutitelson* Ferrara and Taiti, 1982 and *N. kensleyi* Ferrara and Taiti, 1985. It differs from these species in the postero-lateral angle of pereonite 3 protruding backwards. It differs from *N. nanus* in the presence of posterior point in the male pleopod 1 exopod; less developed medial lobes of cephalon; regularly incurved and not broken sides of telson. It differs from *N. acutitelson* in having distinct tuberculation and the medial lobe of cephalon protruding above vertex. It differs from *N. kensleyi* in having rounded instead of rectangular lateral lobes of cephalon, external dorsal angle of uropod protopods not protruding backwards as compared to the ventral one, and the male pereopod 7 ischium with a straight sternal margin.

Distribution. — India: Kovolan, Travancore (VERHOEFF 1936) and Sri Lanka.

Family PORCELLIONIDAE — *"Agnara"* group

This group can presently be defined as a group of Porcellionidae genera whose species have a branched breathing system opening to the outside through a unique hole situated either on the external lateral edge of the exopod of the first 3 pairs of pleopods (*Orthometopon, Tritracheoniscus*) or on all 5 pleopods (*Agnara, Hemilepistus* Budde-Lund, 1908, *Porcellium* Dahl, 1916, etc.).

In our opinion the family Cylisticidae and some genera presently included in the Porcellionidae Bitracheata (*Tura* Budde-Lund, 1908, *Uramba* Budde-Lund, 1908, etc.) could also be placed in this group of species. However, until further data are available, this can only be hypothesized. The proposal to constitute a "genera group" means starting a debate on problems of affinity and should postpone decisions that would further complicate the already entangled taxonomy of Oniscidea, until reliable data are available.

Genus **Agnara** Budde-Lund, 1908

Type-species: *Metoponorthus madagascariensis* Budde-Lund, 1885
Synonymies: *Hemiporcellio* Collinge, 1915, *Protracheoniscus* Verhoeff, 1917

REMARKS. — *Agnara* was established by BUDDE-LUND (1908) as a subgenus of *Porcellio* for the species *Metoponorthus madagascariensis* from Madagascar and the new species *Porcellio (Agnara) fragilis* from Ceylon. As far as we know the only author to attend to this genus was VANDEL (1970) who did so in the wrong sense as discussed above. Our re-examination of the type-specimens of both *A. madagascariensis* and *A. fragilis* establishes that they not only have five pairs of pseudotracheae but also correspond in every detail to species of *Protracheoniscus* Verhoeff, 1917. Moreover, examination of the type-specimens of both *Hemiporcellio carinatus* Collinge, 1915 and *H. immsi* (Collinge, 1914) reveals no differences between *Agnara* and the genus *Hemiporcellio* Collinge, 1915.

Agnara fragilis Budde-Lund, 1908 (Fig. 3)

Porcellio (Agnara) fragilis Budde-Lund, 1908: 287, tab. 14, Figs. 55-59.
Agnara fragilis: VANDEL 1970: 322.

MATERIAL. — 1♂, 4♀♀, Anuradhapura, leg. L. Bartolozzi, 22.XI.1984, MF; 2♂♂, 9♀♀, Bundala, leg. L. Bartolozzi, 30.XI.1984, MF; 5♂♂, 21♀♀, Marabaua, leg. L. Bartolozzi,

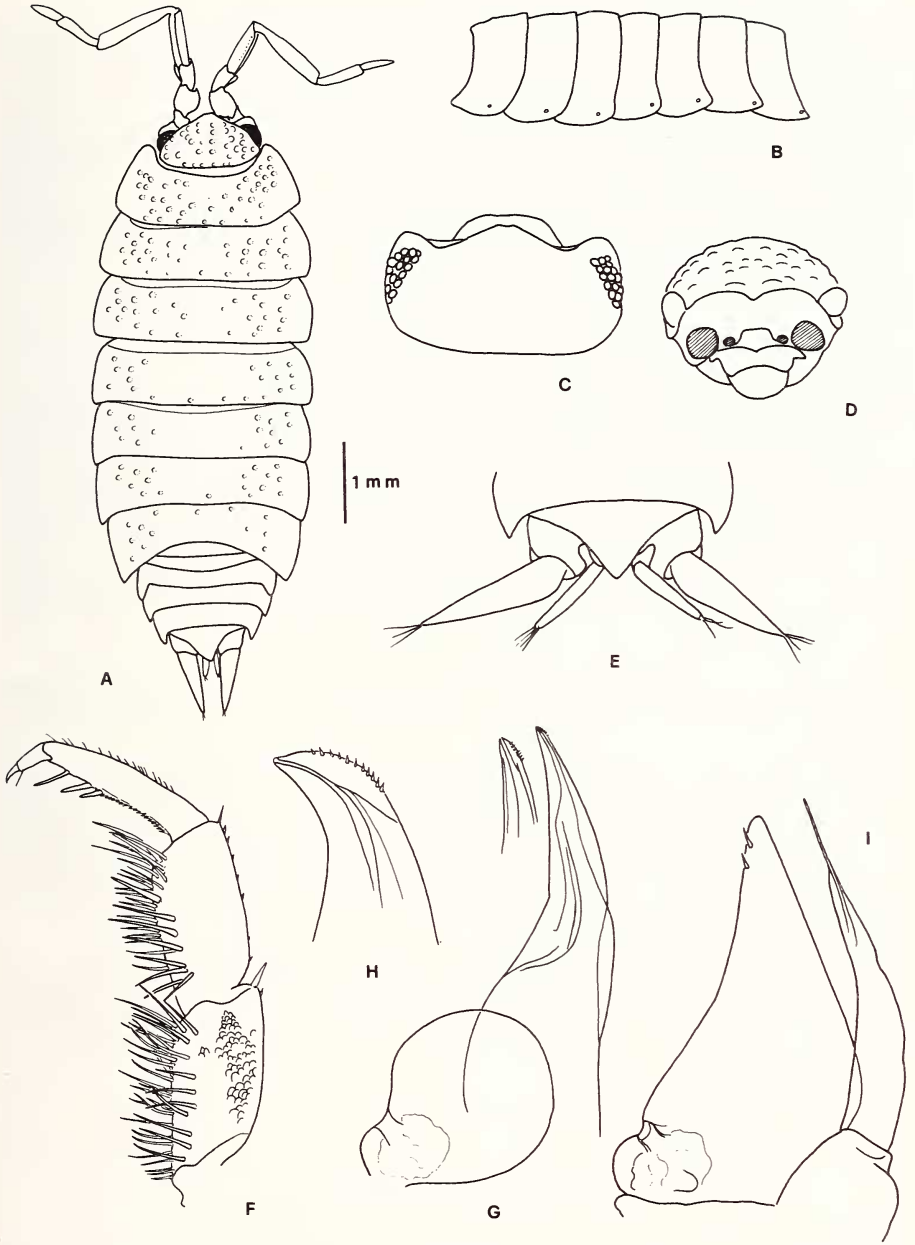

FIG. 3.

Agnara fragilis Budde-Lund, 1908, ♂: A) adult specimen in dorsal view; B) pereon in lateral view; C) cephalon in dorsal view; D) cephalon in frontal view; E) telson and uropods; F) merus, carpus and dactylus of pereopod 1; G) pleopod 1; H) apex of endopod of pleopod 1 of another specimen; I) pleopod 2.

21.XI.1984, MF; 15♂♂, 30♀♀, Wirawila c/o Habantota, leg. L. Bartolozzi, 26.XI.1984, MF; 1♀, Sighiriya, leg. L. Bartolozzi, 23.XI.1984, MF; 1♀, Polonaruwa, leg. P. Beron and S. Andreev, 23.XI.1984, NNHMS; 6♂♂, 3♀♀, Sigiriya, leg. P. Beron and S. Andreev, 25.XI.1984, NNHMS; 7♀♀, North Western Prov., Bangadeniya, 4 mls NNE Chilaw, Loc. 39, leg. LUCE, 1.II.1962, ZIUL; 3♂♂, 12♀♀, North Western Prov., Mundal lake, 16 mls N Chilaw, Loc. 40. leg. LUCE, 1.II.1962, ZIUL; 1♂, 3♀♀, North Western Prov., Saltpan, 3 mls N Puttalam, Loc. 41, leg. LUCE, 1.II.1962, ZIUL; 1♂ juv., North Western Prov., Ambalam, 7 mls NE Puttalam, Loc. 43, leg. LUCE, 1.II.1962, ZIUL; 5♂♂, 2♀♀, North Western Prov., 10 mls E Puttalam, Loc. 45, leg. LUCE, 2.II.1962, ZIUL; 1♂, North Central Prov., Wilpattu National Park, 29 mls NE Puttalam, Loc. 47, leg. LUCE, 2.II.1962, ZIUL; 6♂♂, 15♀♀, North Central Prov., Maradan Maduwa, Wilpattu National Park, 23 mls W Anuradhapura, Loc. 48, leg. LUCE, 2-3.II.1962, ZIUL; 2♀♀ North Central Prov., Hunuvillagama, Wilpattu National Park, 18 mls WSW Anuradhapura, Loc. 49, leg. LUCE, 4.II.1962, ZIUL; 1♂, 3♀♀, North Central Prov., Talawa, 9 mls SSW Anuradhapura, Loc. 51, leg. LUCE, 4.II.1962, ZIUL; 1♂, North Central Prov., Ritigala Natural Reserve, 8 mls NW Habarana, Loc. 56: I, leg. LUCE, 8.II.1962, ZIUL; 2♀♀, North Central Prov., 3 mls S Minneriya, Loc. 67, leg. LUCE, 11.II.1962, ZIUL; 1♂, Central Prov., 5 mls SW Habarana, Loc. 68, leg. LUCE, 11.II.1962, ZIUL; 1♀, Northern Prov., Kudattanai, 6 mls SE Point Pedro, Loc. 70, leg. LUCE, 13.II.1962, ZIUL; 1♀, Northern Prov., Chempiyanpattu, 18 mls SE Point Pedro, Loc. 72, leg. LUCE, 13.II.1962, ZIUL; 1♂, 1♀, Northern Prov., Mankulam, Loc. 74, leg. LUCE, 13-14.II.1962, ZIUL; 1♀, Northern Prov., 2 mls E Mankulam, Loc. 75, leg. LUCE, 14.II.1962, ZIUL; 3♂♂, 5♀♀, Northern Prov., 7 mls E Mankulam, Loc. 76, leg. LUCE, 14.II.1962, ZIUL; 4♂♂, 7♀♀, Northern Prov., Giant's Tank, 10 mls SE Mannar, Loc. 83, leg. LUCE, 15.II.1962, ZIUL; 1♂, 2♀♀, Northern Prov., Nay Aru, Pallamadu, 10 mls E Mannar, Loc. 86, leg. LUCE, 15.II.1962, ZIUL; 1♂, 4♀♀, Uva, Mahaweli Ganga at Alutnuwara, 24 mls E Kandy, Loc. 136, leg. LUCE, 12-13.II.1962, ZIUL.

Remarks. — All these specimens correspond to Budde-Lund's (1908) description and to the type specimens deposited in the British Museum (Cat. No. 1921: 10: 18: 5551-5554).

Description. 7-8 mm long. Female normally brown, mottled with yellow and a pale spot on pereon epimera; male extremely variable: cephalon and pleon black, with pereon yellow (red in vivo?) more or less suffused with black or completely yellow (red?). Tergites slightly granulated. Eye with 18-20 ommatidia. Cephalon: frontal margin very obscurely indicated with a V-shaped incision in the middle. Noduli laterales on a line close to lateral margin; gland pores absent; telson very short with obtuse apex. Antenna: ratio of flagellum joints 11: 10 (proximal: distal).

Male. — Pereopods 1-3 carpus and merus with brushes of long spines on sternal margins. Pereopod 7 without particular structures. Pleopod 1: exopod rounded, endopod with pointed apex, straight in some specimens, bent outwards in others. Pleopod 2 as in Fig. 3I.

Distribution. — Sri Lanka.

Agnara taprobanica n. sp. (Fig. 4)

Material. — Holotype: 1♂, North Central Prov., Habarana, Loc. 55, leg. LUCE, 7-8.II.1962, ZIUL.

Paratypes: 4♂♂, 8♀♀, North Central Prov., Habarana, Loc. 55, leg. LUCE, 7-8.II.1962, ZIUL; 2♂♂, 5♀♀, Western Prov., Ratmalana, 9 mls S Colombo, Loc. 6, leg. LUCE, 7-13.I.1962, ZIUL; 2♂♂, 4♀♀, Eastern Prov., Kuchchaveli, 20 mls NW Trincomalee, Loc. 60, leg. LUCE, 9-10.II.1962, ZIUL.

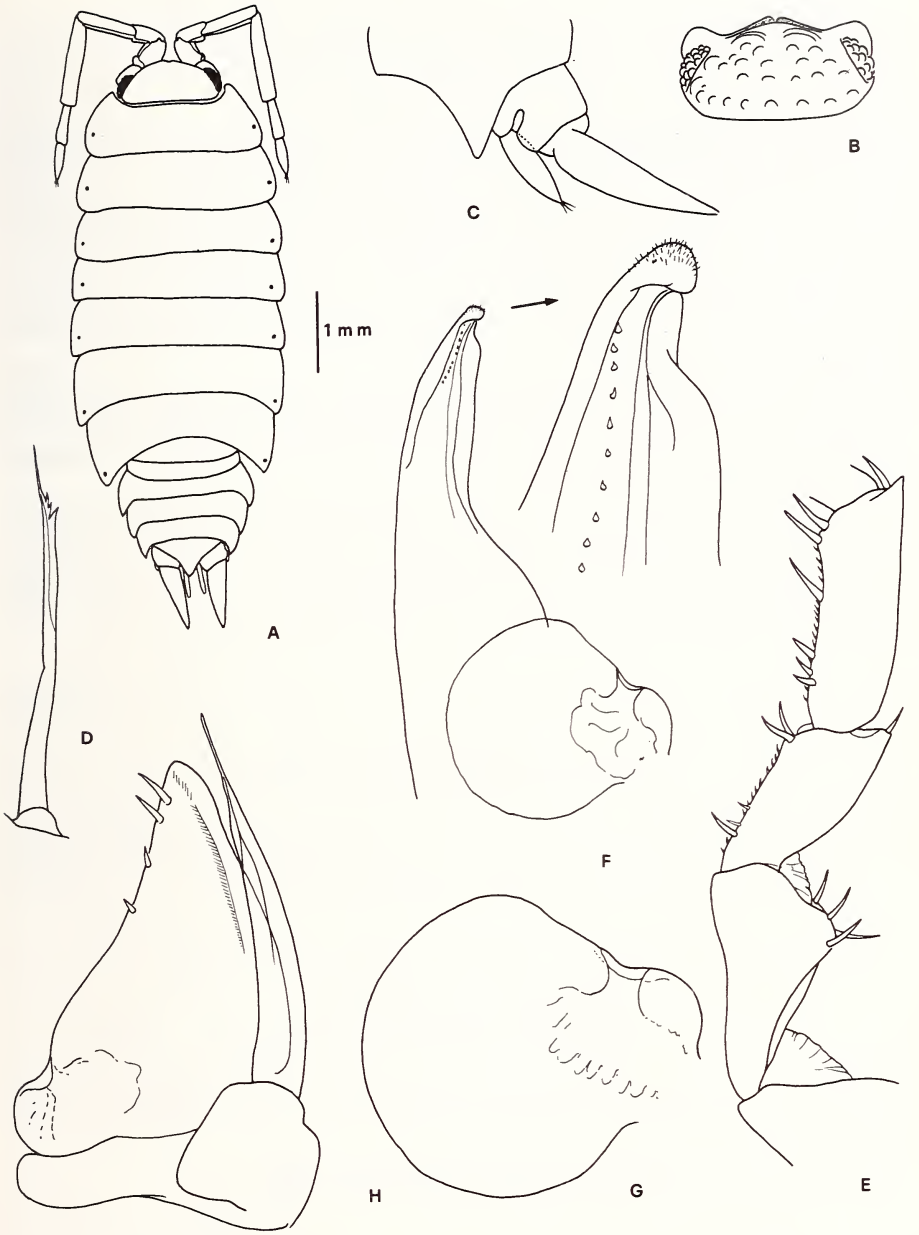

FIG. 4.

Agnara taprobanica n. sp., ♂: A) adult specimen in dorsal view; B) cephalon in dorsal view; C) telson and right uropod; D) spine of carpus and merus of pereopods 1-3; E) pereopod 7; F) pleopod 1; G) exopod of pleopod 1; H) pleopod 2.

DESCRIPTION. 8-10 mm long. Dark brown mottled with yellow; epimeral margins of pereonites, I and II and distal portion of V joint of antennal peduncle, uropod protopod colourless (as preserved). Eye with 20 ommatidia. Vertex and pereon tergites with distinct tubercles arranged in transversal rows; a row of pointed tubercles on posterior margins of cephalon, pereonites and pleonites. Back equipped with upright setae; gland pores absent, noduli laterales arranged on a row close to the lateral margin of pereonites (as in *A. fragilis*); epimera of pereonites 2-4 demarcated in female. Cephalon: lateral lobes rounded, bent downwards and directed outwards, frontal margin scantily raised, with a V-shaped incision in the middle. Pereonites 1-2 with posterior margin straight, postero-lateral angles rounded. Posterior points of pleonites 3-5 short. Telson with distinctly incurved sides, subacute apex. Antenna with joints of peduncle carinate, ratio of flagellar joints 7: 5. Protopod of uropod with a Λ-shaped incision on external margin; exopod about twice as long as endopod.

MALE. — Pereopods 1-3 carpus and merus with brushes of long pointed spines. Pereopod 7 ischium distally enlarged. Pleopod 1 exopod almost rounded, endopod with apical portion short and thickset, strongly bent outwards and equipped with fine setae; apex rounded. Pleopod 2 as in Fig. 4H.

REMARKS. — This species is very close to *A. fragilis* from which it differs essentially by the peculiar shape of the male pleopod endopod 1. This character readily distinguishes *A. taprobanica* n. sp. from all the other species of the genus.

Derivatio nominis: Taprobane is the ancient greco-roman name of the Sri Lanka island.

Genus **Porcellionides** Miers, 1877
Porcellionides pruinosus (Brandt, 1833)

MATERIAL. — 2♂♂, 5♀♀, Iammaduwa, leg. Jous, Prossara and Forrook, 1080, 24.IX.1974.

Distribution. — Cormopolitan species of Mediterranean origin.

Genus **Porcellio** Latreille, 1804
Porcellio scaber Latreille, 1804

MATERIAL. — 14♂♂, 8♀♀, Nuwara Elyia, 1900-2100 m, leg. P. Beron, 28.XI.1984, NNHMS; 1♀, same data, leg. L. Bartolozzi, 26.XI.1984, MF; 1♀, Uva, Haputale, leg. LUCE, 3.III.1962, ZIUL.

Distribution. — Cosmopolitan species of European origin.

Porcellio dilatatus Brandt, 1833

MATERIAL. — 2♀♀, Nuwara Elyia, leg. L. Bartolozzi, 26.XI.1984, MF.

Distribution. — European species introduced to Sri Lanka.

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